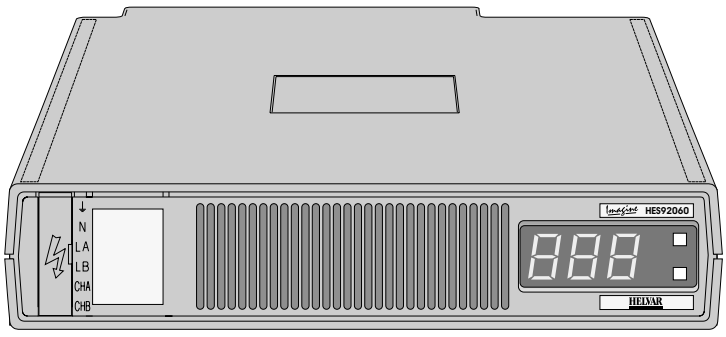
USER GUIDE
for the

HES92060
SINEWAVE DIMMER Module



User Guide for the
Imagine HES92060 SINEWAVE DIMMER Module
Document 7860088 Issue 1 (27/02/03)

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Issued by:

Helvar Merca Ltd.,
Hawley Mill,
Hawley Road,
Dartford,
Kent,
DA2 7SY,
United Kingdom.
www.helvar.co.uk

Printed in the United Kingdom.

PREFACE

Scope of this User Guide

The descriptions and instructions contained in this guide are based on the assumption that the *DIMMER* module is being installed and used as part of a Helvar Merca Ltd. *Imagine* Lighting System.

The installation instructions refer to the *DIMMER* module being installed in a *STACKER* unit.

Technical Specifications

Any technical data required for the correct installation and use of the *DIMMER* module is contained in this user guide.

Firmware Version

The operational instructions contained in this user guide assume that the *DIMMER* module is using the following firmware version:

HES92060 version 1.0 firmware.

The dimmer module briefly reports the firmware version during power-up test. Refer to section 2, page 10 for further details.

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SECTION 1
INTRODUCTION

This section covers the following topics:

- General Description.
- External Layout.

GENERAL DESCRIPTION

The HES92060 *DIMMER* module provides a single channel of sinewave dimming which can be controlled by the following methods:

- Local Control (Integral Control Panel).
- S-DIM (Serial DIMmer communications) Data Highway.
- Analogue Control Input.

The HES92060 sinewave dimmer functions as an electronic variac by smoothly scaling the natural input sine wave usually supplied to the dimmer, giving out the same natural sine wave, but of a smaller amplitude.

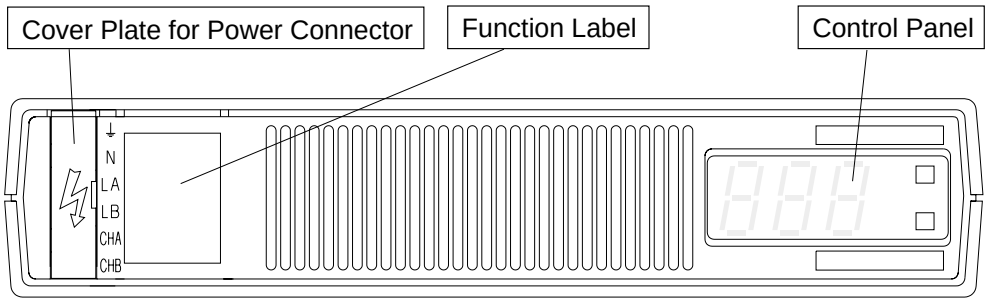
The HES92060 is suitable for use with all mains dimmable lamp loads.

When used in an *Imagine* Lighting System, all of the *DIMMER* module's parameters are down-loaded from the *SCENESET* module via the S-DIM data line.

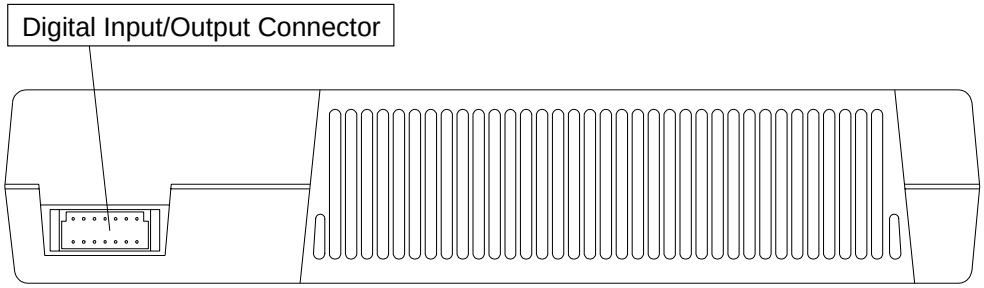
> ***IMPORTANT NOTE***
> *The DIMMER module will not respond to S-DIM commands from an Imagine System until the output channel address has been correctly set.*

EXTERNAL LAYOUT

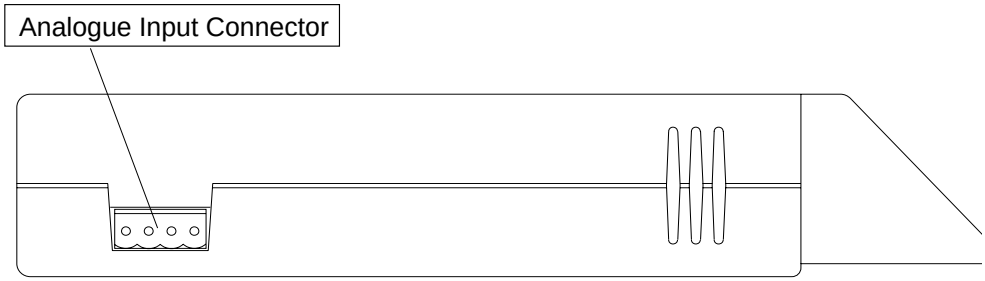
Front Panel



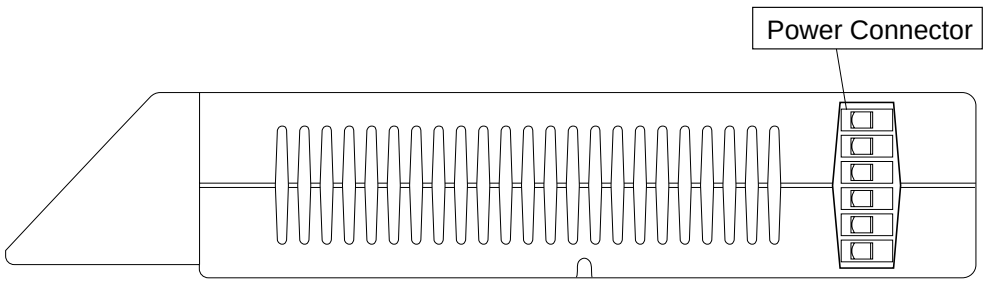
Rear Panel



Right Side Panel



Left Side Panel



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SECTION 2
INSTALLING THE *DIMMER*

This section covers the following topics:

- Input supply requirements.
- Installing into a *STACKER* unit.
- Connections for supply and output.
- Removal procedure.
- Setting-up procedure.

INPUT SUPPLY

Voltage Range

The *DIMMER* module is supplied as a universal input for 115/230V a.c. operation.

- HES92060 **115V or 230V a.c.** (nominal); **90V – 255V a.c.** (absolute).
  DC operation **90V – 250V d.c.** contact Helvar for details.

Check that the module is set for the correct range for the intended power supply by referring to the serial no./rating plate on the underside of the module.

> ***CAUTION***
> *Connecting a supply which exceeds the maximum limit may cause irreparable damage to the DIMMER module.*

Frequency Range

The input supply frequency should be within the the range 40 – 75Hz, or DC. A supply frequency outside this range will cause the *DIMMER* module to shut-down.

Supply Protection

The rating of the fuse or MCB will depend on the method of *DIMMER* cooling employed:

	Convection Cooled	**Fan Cooled**
MCB/Fuse rating (per Channel)	4A	10A

INSTALLING INTO A STACKER UNIT

> ***WARNING***
> *For your own safety, before attempting to install the DIMMER module, ensure that the input supply MCB is in the 'off' position and if possible, isolate the MCB input terminal from the mains supply.*

1. Carefully insert the *DIMMER* module into the appropriate slot of the *STACKER* unit, ensuring that the rear connector locates firmly into the motherboard at the back of the *STACKER*.

2. If required, secure the module to the *STACKER* by inserting a suitable retaining screw on the left-hand side (see Fig.2-1).

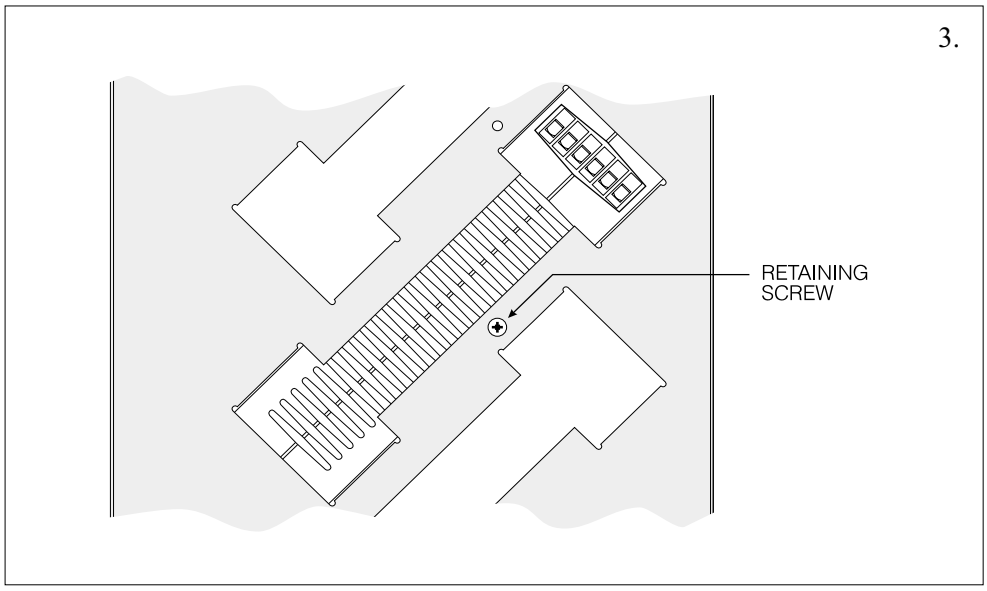

Fig.2-1: Location of retaining screw.

Insert the blade of a small flat-bladed screwdriver into the notch on the terminal cover plate, and gently prise out the plate to gain access to the terminal screws for the power connector (see Fig.2-2).

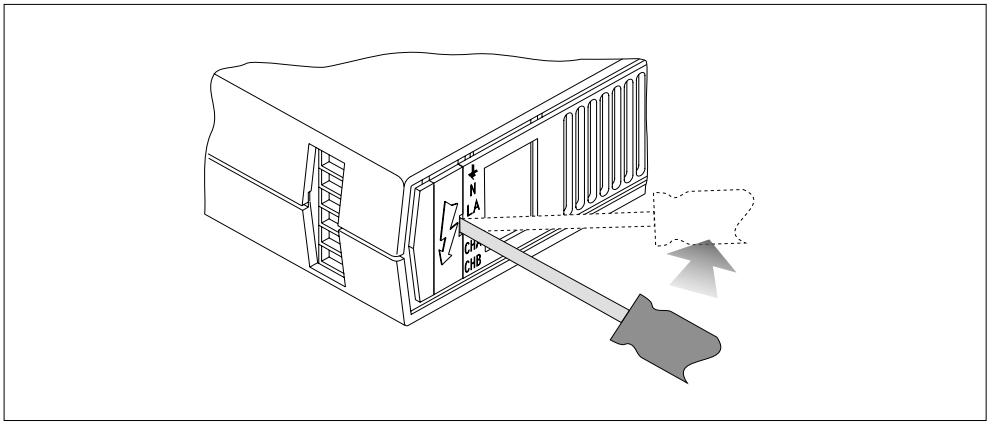

Fig.2-2: Removing the power terminal cover.

4. Using suitable cable, make the following connections between the *DIMMER* module and the distribution panel:

***DIMMER* Module**	**Distribution Panel**	**Wire Colour**
Terminal ⏚	Earth .	Green / Yellow.
Terminal N.	Neutral.	Blue.
Terminal LA.	Live feed from MCB.	Brown.
Terminal LB.	No Internal Connection	-
Terminal CHA.	Appropriate output terminal.	Red.
Terminal CHB.	No Internal Connection	-

Recommended cable type: TRI rated 105C (BS6231 approved).
Cable size: 2.5mm^2.
Stripping length: 12mm.
Terminal screw torque: 0.8Nm.

5. Clip the terminal cover back into position.

6. Write the function or circuit details of the channel on the label in the recessed area of the front panel next to the terminal cover plate. If required, the label may be removed as shown in Fig.2-3.

7. Make the connections, if required, to the analogue input, refer to page 26.

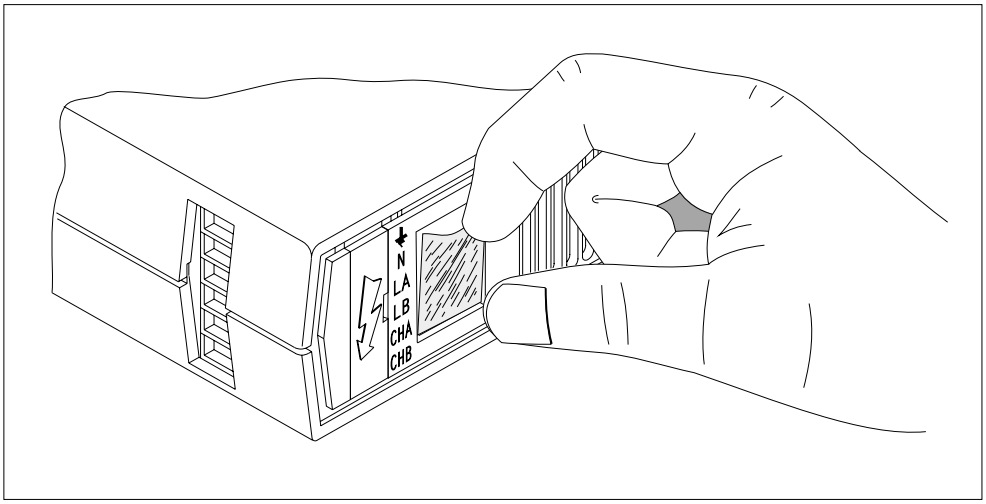

Fig.2-3: Removing the front panel label.

The physical installation of the *DIMMER* module is now complete. For the testing and setting-up procedure, refer to page 10.

REMOVAL PROCEDURE

If a *DIMMER* module needs to be removed from the *STACKER* unit, ensure that the channel address is known.

If not, check the address by following the instruction procedure in section 3, page 18. Then proceed as follows:

> ***WARNING***
> *For your own safety, before attempting to remove the DIMMER module, ensure that the input supply MCB is in the 'off' position and if possible, isolate the MCB input terminal from the mains supply.*

1. Insert the blade of a small flat-bladed screwdriver into the notch on the terminal cover plate, and gently prise out the plate to gain access to the terminal screws for the power connector (see Fig.2-2).

2. Unscrew the terminals and withdraw each cable. It is suggested that the input and output cables are identified with a label to assist reconnection.

3. If the *DIMMER* module (or a replacement) is not to be refitted immediately, ensure that the ends of the connecting cables are made safe and secured away from all other connections.

4. Unplug any leads to the analogue input connector on the right-hand side.

5. Remove the locking screw (if fitted) from the left-hand side of the module (see Fig.2-1).

6. Grip the sides of the *DIMMER* firmly with both hands (through the slots in either side of the *STACKER*) and carefully ease the module forward to disengage the rear connector. Continue to ease the module out until the front is clear of the other modules enabling it to be withdrawn.

SETTING-UP PROCEDURE

The setting-up procedure for the *DIMMER* module is divided into three stages, which must be followed in the order listed below:

- Stage 1 – Power-up Test.
- Stage 2 – Output Test.
- Stage 3 – Set the Output Channel Addresses.

If it is not required to test the output (*i.e.* to check for correct load operation and wiring) then stage 2 may be omitted.

> ***IMPORTANT NOTE***
> *The DIMMER module will not respond to S-DIM commands from an Imagine System until the output channel address has been correctly set (stage 3).*

Stage 1 – Power-up Test

Turn on the supply to the *DIMMER* module; the display will briefly show '888' then the firmware versions, and then clear to show the default display mode (Fig.2.4).

Fig.2-4: Default display.

If the display repeatedly flashes a 3 digit number , the module has detected a problem. Refer to section 5, page 30 for further details.

Stage 2 – Output Test

> ***CAUTION***
> *Before attempting this test, ensure that any load connected to the DIMMER module output is suited to Dimming . An incompatible load type may result in damage to the module or the load.*

Press and hold the top button on the *DIMMER* module's control panel to turn-on and raise the level of CHA (as indicated by the left-hand digit on the display). Press and hold the lower button to return the output to zero level.

Stage 3 – Set the Output Channel Address

Before the *DIMMER* module can operate correctly as part of the *Imagine* System, the Channel Address must be defined.

For details, refer to Section 3, page 18.

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SECTION 3
DIMMER OPERATING INSTRUCTIONS

This section covers the following topics:

- Controls and Display Functions.
- Output Level.
- Channel Address.
- Hysteresis (Turn-on and Turn-off Levels).
- *SCENESET* Number.
- Output Level Override.

CONTROLS AND DISPLAY FUNCTIONS

The *DIMMER* module has a control panel with two push-buttons and a three character digital display (Fig.3-1).

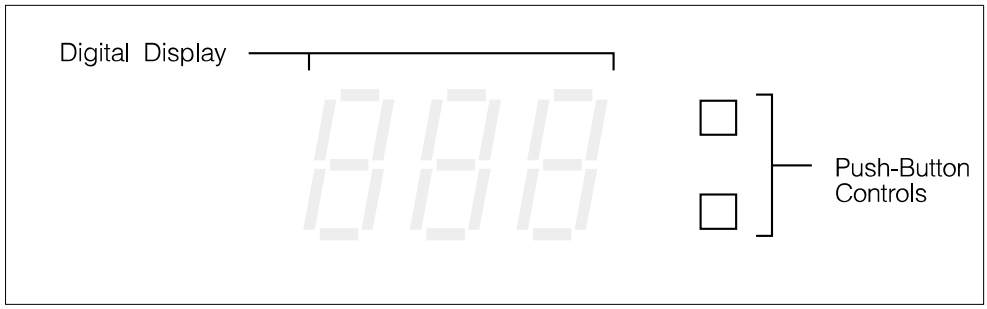


Fig.3-1: DIMMER control panel.

Display Modes

The display can be used in six different modes.

- Output Level.
- Channel Address.
- Dimming Law(Not used).
- Hysteresis (turn-on & turn-off level).
- S*CENE*S*ET* Number/internal dimmer temperature display.
- Override Level.

Each mode allows a particular setting for the dimmer output to be viewed and if required, a new value (except for the S*CENE*S*ET* number/temperature) can be entered.

When controlled by a *SCENESET* module it is necessary to set the channel address only. All other parameters will be set automatically.

Control Lock-out

The ability to change individual settings by using the integral control panel can be disabled or 'locked-out' by the controlling *SCENESET* module.

When a setting is locked-out, it can only be modified by the controlling SCENESET module.

Default Mode

The display defaults to Output Level Mode when the *DIMMER* module is powered-up. The display will also return to this mode if no buttons are pressed for ten seconds while another mode is selected.

Changing the Display Mode

Procedure	Display & Buttons
1. With the display showing Output Level Mode, press and hold the two buttons.	
2. After one second approximately, the display will change to the Channel Address Mode. Maintaining pressure on both buttons will cause the display to step through each mode.	
Dimming Law Mode... (not used in HES92060)	
Hysteresis Mode...	
SCENESET Number/Internal Temperature Mode...	
Override Mode...	
Then back to Output Level Mode...	
3. Releasing the buttons will select the mode currently displayed.	
4. If no further buttons are pressed within ten seconds, the display will revert to Output Level Mode..	

OUTPUT LEVEL MODE

In this mode, the display shows the following information:

- Output Level.
- Operating Status.
- S-DIM Data Line Status.

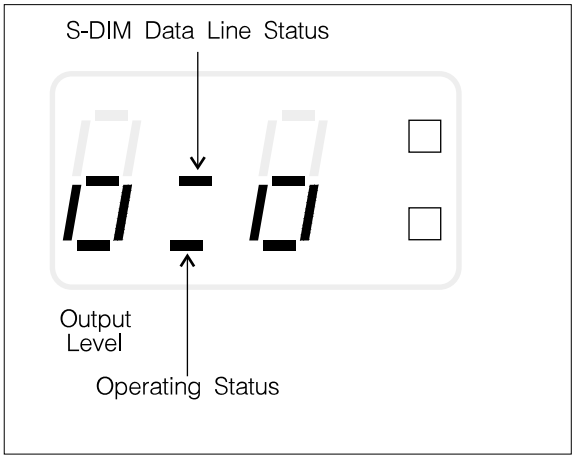


Fig.3-2: Channel level mode display.

Output Level

The left-hand digit indicates the level of the output.

The level is expressed in terms of percentage control. Note that only the decade (tens) component of the output level is displayed (see Fig.3-3):

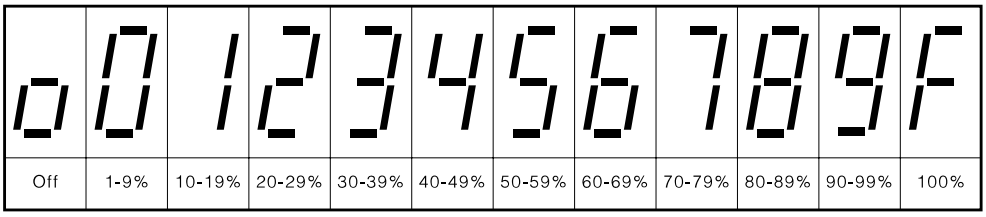


Fig.3-3: Display conventions for output levels.

Operating Status

When this segment is illuminated in Channel Level Mode, it indicates that the *DIMMER* module is operating normally.

S-DIM Data Line Status

When the S-DIM data highway is functioning correctly, this segment will blink every time a valid S-DIM message has been received and decoded.

However, even if S-DIM messages are being received, this segment will not blink until the channel address has been correctly set (see page 18).

Changing the Output Level

The output level will normally be set by the controlling *SCENESET* module. However, to change the level manually, proceed as follows:

Procedure	Display & Buttons
1. Check that the display is showing Output Level Mode.	
2. To change the level of the output, press and hold either the top button to increase the level or the bottom button to decrease the level.	
3. When the required level is shown, release the button.	

SCENESET Control

When the *DIMMER* module is under *SCENESET* control, the output level is checked periodically against the current scene. If the level is different (*e.g.* has been changed manually), the *SCENESET* module will return the level to the correct setting for that scene.

Analogue Control

The output level can also be set by using the analogue input. For further details, refer to section 4, page 26.

CHANNEL ADDRESS MODE

This mode enables the address to be defined. The *DIMMER* module supports the following addresses:

- **001 – 128** for use with the *Imagine* Lighting System.
- **001 – 252** for use with the *Lighting Router* System.
- **1 – 16** for use with *460 DALI-SDIM Converter* System.
- **251 – 254** for use with the *Ambience* Lighting System.

When the *DIMMER* module is supplied, the address is factory set to 251.

> ***IMPORTANT NOTE***
> *The DIMMER module will not respond to S-DIM commands from an Imagine System until the output channel address has been correctly set.*

Control Lock-out

If an address is selected which has been 'locked' by the controlling *SCENESET* module, that address cannot be changed again unless the *SCENESET* is reprogrammed or the *DIMMER* module de-powered and the address reset before an S-DIM message is received.

Changing the Channel Address

Procedure	Display & Buttons
1. With the display showing Output Level Mode, press and hold the two buttons.	
2. Wait for the display to change to Channel Address Mode (approximately one second) then release both buttons.	
3. To change the address, press and hold either the top button to increase, or the bottom button to decrease the number. To leave the address as it is, go to step 5.	
4. To store the new address shown, press and hold both buttons until the display briefly shows '888' to confirm that the new value has been stored in the *DIMMER*'s memory.	
5. The display will revert to Output Level Mode after storing the new address, or ten seconds after releasing the buttons.	

HYSTERESIS MODE (Turn-on/ Turn-off Levels)

This mode is used to set the percentage level at which the output turns on and off (assuming maximum level is 100%). This is referred to as 'hysteresis' or as the turn-on and turn-off levels.

The display will show a letter and a two-digit value. The letter indicates the turn-off level and the digits show the turn-on level.

- The turn-on level can be set between 2% and 64% in 2% increments.
- The turn-off level can be set to be either 1% *less than* the turn-on level (display shows the letter 'r') or to 80% *of* the turn-on level (display shows the letter 'h').

When the *DIMMER* module is supplied, the output is set to a turn-on level of 2% with a turn-off level of 1% (as example 1):

Example 1

Turn-on level = **2%**.

Turn-off level 'r' = (2 – 1)
= **1%.**

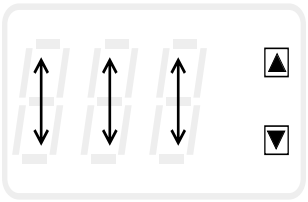
Example 2

Turn-on level = **50%.**

Turn-off level 'h' = (50 x 0.8)
= **40%.**

Note: *The turn-off level for the 'h' setting is calculated to the nearest 0.5%.*

Changing the Turn-on and Turn-off Levels

Procedure	Display & Buttons
1. Press and hold the two buttons until the display shows the Hysteresis Mode.	
2. To change the setting, press and hold either the top button to increase, or the bottom button to decrease the setting. ***Note:*** *The display will cycle through the turn-on levels for* 'r' and 'h' turn-off settings. To leave the setting as it is, go to step 4.	
3. To store the new setting shown, press and hold both buttons until the display briefly shows '888' to confirm that the new value has been stored in the *DIMMER*'s memory.	
4. The display will revert to Output Level Mode after storing the levels, or ten seconds after releasing the buttons.	

SCENESET NUMBER/INTERNAL TEMPERATURE DISPLAY MODE

In a large system, each *DIMMER* module can be connected to one of up to eight *SCENESET* modules.

In this mode, the display will show the number of the controlling *SCENESET* module. This is an advisory display only and cannot be changed.

The display will show the letters ' ' followed by a number from 1 to 8.
If the display shows ' ', then there is no *SCENESET* connected.
The display will then change to show the dimmer's internal temperature in Celcius to aid diagnostics.

Checking the *SCENESET* Number/Internal Temperature

Procedure	Display & Buttons
1. Press and hold the two buttons until the display shows the *SCENESET* Number Mode.	
2. The display change to show the dimmer's internal temperature in Celcius. Ten seconds after the buttons are released.	
2. The display will then revert to the level display mode, after ten seconds, if no buttons are pressed.	

OUTPUT LEVEL OVERRIDE

The output can be pre-programmed with an override level. This is the level that will be applied to the output if the *DIMMER* module's Output Level Override circuit is activated. The output is factory-set to full power (100%), but this can be changed as required.

This function is normally used by the Watchdog facility on the controlling *SCENESET* module.

Setting the Override Level

Procedure	Display & Buttons
1. Press and hold the two buttons until the display shows the Override Mode.	
2. To change the setting , press and hold either the top button to increase or the bottom button to decrease the setting.	
3. To store the new setting, press and hold both buttons until the display briefly shows '888' to confirm that the new value has been stored in the *DIMMER'S* memory.	
4. The display will revert to Output Level Mode ten seconds after releasing the buttons.	
5. If the Level Override circuit is now activated, the display will show the programmed level. Also, vertical bars in the centre of the display will move from side to side. ***Note:*** *Whilst Level Override is active, the output level cannot be changed by the DIMMER* module controls.	

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SECTION 4
ANALOGUE CONTROL

This section covers the following topics:

- Control Priority
- Analogue Connector.
- Basic Control Circuit.

ANALOGUE CONTROL

As well as being controlled by the S-DIM data highway, the level of the *DIMMER* output can also be set by a 0 – 10V analogue input.

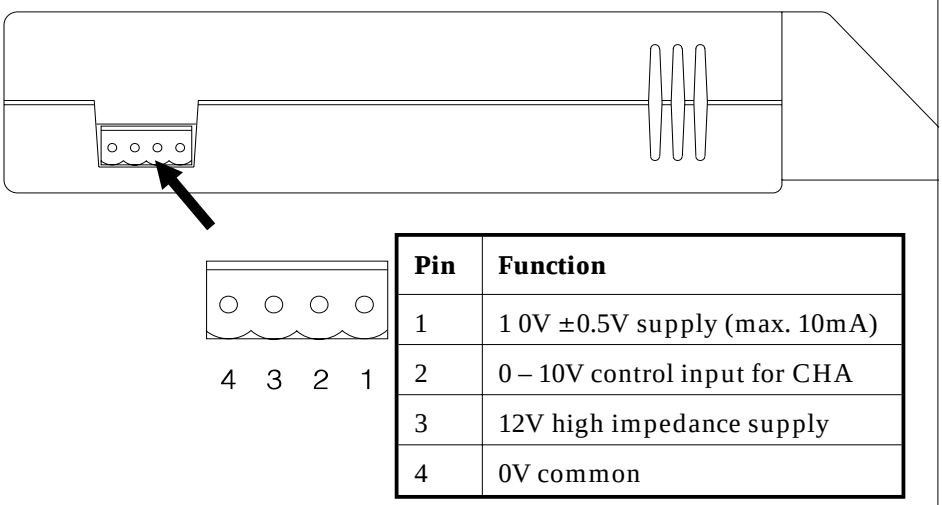
The control level is directly proportional to the analogue input, *e.g.* 5V input will give 50% control level, 10V will give 100%, *etc.*

Control Priority

If the output is controlled by both an S-DIM and analogue input, the input which defines the highest output level will take priority.

Analogue Connector

This is located on the right-hand side of the *DIMMER* module (see Fig.4-1):



Pin	Function
1	1 0V ±0.5V supply (max. 10mA)
2	0 – 10V control input for CHA
3	12V high impedance supply
4	0V common

Fig.4-1: Analogue input connector.

Suitable mating connector:	Helvar part no. T1704 *(not supplied).*
Cable size:	0.2 – 2.5mm^2.
Stripping length:	7mm.
Recommended cable type:	Equipment wire.
Maximum cable length:	100m.

To use 3-wire potentiometer style controls, pins 1, 2 and 4 are used.
To use current sink style or 2-wire controls, connect pins 2 and 3 together, with pin 4 still used as the 0V common. Pin 1 is then unused .

Basic Analogue Control Circuit

A typical 3-wire analogue control circuit is shown in Fig.4-2.

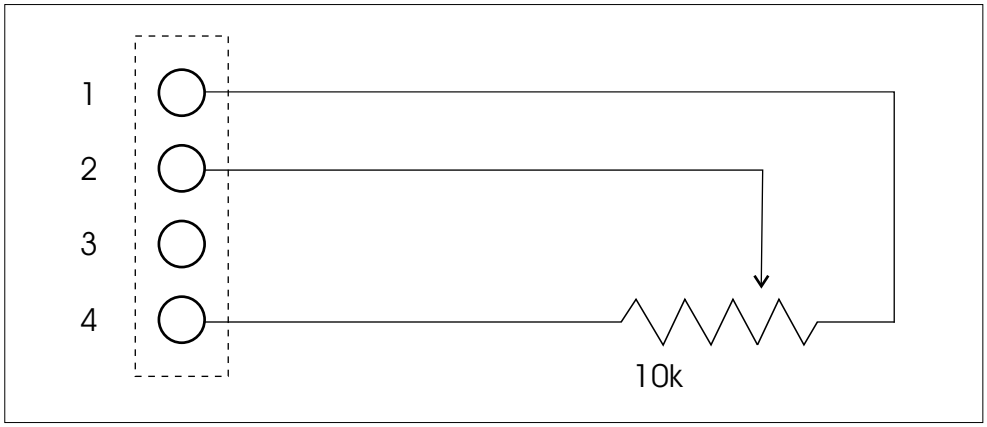


Fig.4-2: Basic 3-wire analogue control circuit.

A typical 2-wire analogue control circuit is shown in Fig.4-3.

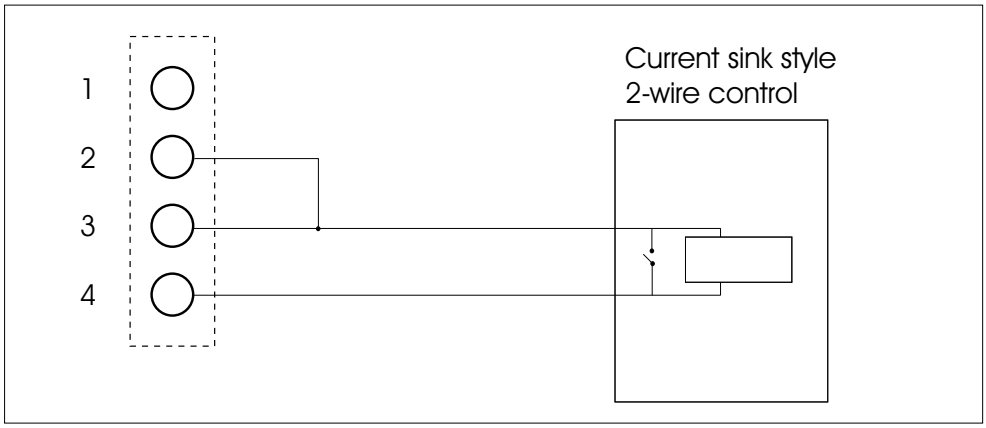


Fig.4-3: Basic 2-wire analogue control circuit.

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SECTION 5
DIMMER TROUBLESHOOTING

This section covers the following topics:

- Diagnostic Codes.
- Problem Diagnosis.

DIAGNOSTIC CODES

Whenever the *DIMMER* module detects an abnormal condition, a flashing diagnostic code will be displayed on the front panel.

The codes fall into three categories:

- 'Fatal'.
- Self-recoverable.
- Communication.

The tables on the following pages list the codes, their likely causes and what action, if any, needs to be taken.

If a diagnostic code is displayed which is not listed, this may indicate an internal fault condition. If this occurs, please call your service agent.

‘Fatal’ Codes

In the event of a ‘Fatal’ Code , the output of the *DIMMER* module will be automatically turned off (*i.e.* set to zero level). The output cannot be used until the cause has been cleared.

Code	Likely Cause	Action
003	The mains frequency is not in the range 40–75Hz. The mains supply is ‘noisy’. Internal circuit fault.	Turn off the supply to the *DIMMER* module for a few seconds, then turn back on. If the code recurs, check the mains frequency. If the mains frequency is O.K. but the code recurs, call for service.
004	Internal circuit fault.	Turn off the supply to the *DIMMER* module for a few seconds, then turn back on. If the code recurs, call for service.
007	The internal circuit temperature has exceeded 90C. Internal circuit fault.	Turn off the supply to the *DIMMER* module ***immediately*** and call for service. ***Warning:*** *Do not turn the supply back on. Internal damage may have resulted from the high temperature.*

Self-recoverable Codes

In the event of a Self-recoverable Code the *DIMMER* module will reduce the current on the output. The output level cannot be increased until the cause has been cleared.

Code	LikelyCause	Action
051	The internal circuit temperature has exceeded 70C. ***Note:*** *The output level will reduce.*	Check that all ventilation grilles are free from obstructions. If the module is not being forced-air cooled, check that the load for each output is not exceeding 3A. If the ventilation and loading are O.K., call for service.
010	Output current has exceeded the maximum of 10A. ***Note:*** *Output level will reduce.*	If the code does not clear, the associated lighting circuit is probably overloaded.
009	Instantaneous peak current (15.5A) has been exceeded. The output will be turned off.	Hold the lower button in until the level shows '0_0'.This re-enables the dimmer output. If the error re-occurs, check the load.
008	The hardware overcurrent protection has been tripped.	Check the load for short circuits.
011	The supply voltage to the dimmer has been exceeded. The output level may be reduced.	Check the supply.

Communication Codes

These are advisory codes and will not usually change the current status of the *DIMMER* module. However, subsequent S-DIM or control panel commands may be ignored until the code has been cleared.

Code	Likely Cause	Action
052	Error in S-DIM message.	The S-DIM message is ignored. The condition should clear automatically after ten seconds.
054	General error in S-DIM communications link.	The S-DIM message is ignored. The condition should clear automatically after ten seconds.
056	Checksum error in S-DIM message.	The S-DIM message is ignored. The condition should clear automatically after ten seconds.
156 230 231	Internal Communications error between processors.	The condition should clear automatically after ten seconds.

Repeated problems with the S-DIM data highway are most likely to be caused by bad connections, data cables running through electrically ‘noisy’ environments or incorrect configuration of other devices in the system.

If further advice is needed, contact the system installer or service agent.

PROBLEM DIAGNOSIS

If the *DIMMER* module fails to operate as expected, it is more likely to be the result of incorrect setting-up and configuration than a fault with the module itself. Alternatively, there may be a problem elsewhere in the system.

Before calling for service, check through the following list of problems and likely causes:

Problem	**Likely Cause & Remedy**
Display is blank.	No power to power input LA. Check appropriate MCB or fuse.
Output loads not dimming correctly.	Hysteresis set incorrectly (see section 3, page 20).
Output not responding to S-DIM control.	Channel Addresses not correctly set (see section 3, page 18). Incorrect or faulty connections on the S-DIM data line. Check that the rear connector is fully seated on to the *STACKER* motherboard. *DIMMER* module is not connected to a *SCENESET (see section 3, page 22).*
Channel Address cannot be changed by the front panel controls.	The Channel Address is 'locked-out' by the *SCENESET* module.
A *DIMMER* parameter cannot be changed by front panel controls.	The parameter is 'locked-out' by the *SCENESET* module.

HELVAR Merca Ltd.
Hawley Mill
Hawley Road
Dartford, Kent. DA2 7SY
United Kingdom.

Telephone: +44 (0)1322 222211.
Facsimile: +44 (0)1322 282216.

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